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论文与报告

融合局部结构和差异信息的监督特征提取算法

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摘要
针对监督局部保持投影(Supervised locality preserving projection, SLPP)存在过学习和不能较好地保持图像空间的差异信息等问题,造成算法性能不够好, 提出了一种新的基于流形学习的监督特征提取方法(Supervised local structure and diversity projection, S-LSDP). S-LSDP从信息统计量角度引入差异信息,并给出度量差异信息大小的准则(差异离散度) 及明确的物理含义;然后通过最小化局部离散度和最大化差异离散度准则提取投影方向. 投影后的特征既能有效地保持图像之间的局部结构属性,又能较好地保持图像之间的差异信息, 而且避免了过学习问题.在UMIST, Yale, PIE和AR数据库上的实验结果表明了该算法的有效性.

关键词 特征提取 流形学习 局部离散度 差异离散度 人脸识别
分类号

Supervised Feature Extraction Based on Information Fusion of Local Structure and Diversity Information

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Abstract
Supervised locality preserving projection (SLPP) seeks to find the projection which efficiently preserves the local structure of data points embedded in high-dimensional data space. However, it has the over-learning problem and does not preserve the diversity information of data which is also useful for data recognition. A novel feature extraction method based on manifold learning, namely supervised local structure and diversity projection (S-LSDP), is presented to address this problem. The S-LSDP introduces the diversity of data points from the perspective of statistic and then calculates diversity scatter via the diversity of data points to measure the diversity information of data. A concise feature extraction criterion is raised by minimizing the local scatter, which efficiently preserves the local structure and simultaneously maximize the diversity scatter. Different from the most existing manifold learn methods, the S-LSDP not only preserves both the local structure and diversity information of data, but also avoids the data over-fitting problem. Extensive experiments in UMIST, Yale, PIE, and AR face database show the efficiency of the proposed method.

Key words Feature extraction manifold learning locality scatter diversity scatter face recognition

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